

# **CBO PAPERS**

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**OFFICER COMMISSIONING  
PROGRAMS:  
COSTS AND OFFICER PERFORMANCE**

**June 1990**



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## PREFACE

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Recent events, both national and international, have caused a rethinking of U.S. military posture. Most notable among these events are domestic budgetary pressures associated with deficit reduction efforts and arms control negotiations in the wake of a declining threat from the Soviet Union. Taken together, these events signal a smaller military force in the future. This in turn may mean a reduction in the officer corps.

To assist the Congress in its consideration of the downsizing of the officer corps, this CBO paper reviews the cost of selected major officer procurement programs of the military services and the performance of officers from each source commissioned through these programs. The paper documents analyses presented in testimony requested by the Subcommittee on Manpower and Personnel of the Senate Armed Services Committee. In keeping with the mandate of the Congressional Budget Office (CBO) to provide objective analysis, it makes no recommendations.

Marvin M. Smith of CBO's National Security Division prepared the paper with assistance from Jonathan Ladinsky and under the general supervision of Robert F. Hale and Neil M. Singer. The paper was edited by Francis Pierce. Darlene Miller-Young provided typing assistance.

Robert D. Reischauer  
Director

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## SUMMARY

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Current arms control negotiations between the United States and the Soviet Union seem likely to lead to reductions in the size of U.S. military forces. The prospect of using the savings from cuts in defense spending to address the budget deficit problem will reinforce efforts to decrease strength levels substantially over the next several years. One consequence of these reductions will be drawdowns in the size of the officer corps, which will lead, in turn, to a decline in the requirements for new officers.

Any such decreases in requirements will lead the services and the Congress to reexamine the appropriate proportions of new officers from the various commissioning sources. This CBO Paper reviews the three principal programs for commissioning officers: the three service academies, the Reserve Officers Training Corps (ROTC), and officer candidate or officer training schools (OCS/OTS).<sup>1</sup> It compares the commissioning sources by focusing on the cost and performance differences among them.

## COSTS OF OFFICER PROCUREMENT PROGRAMS

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The service academies have the highest budgetary costs of the three commissioning sources. It costs the Department of Defense about three to four times as much to train an officer at one of the service academies as it would to train the officer through a typical ROTC scholarship program. The budgetary cost of the service academies is about eight to fifteen times as high as that of OCS/OTS (see Summary Table).

These differentials are somewhat smaller if, instead of the budgetary cost of training a new officer, the total cost to society is considered. In the case of the military academies, the Defense Department (DoD) bears the full social cost of providing a college education. In other commissioning programs, however, some of the costs are borne either by the trainee or by other elements of society. For ROTC graduates, for example, only part of the educational cost is reflected in DoD costs, and for OCS/OTS commissioners, none of the cost is included. From the viewpoint of the Congress, however, the appropriate measure to consider is the cost to DoD.

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1. This analysis excludes "direct" commissioning programs for officers in professional specialties such as the medical, nursing, chaplains, and legal corps.

## PERFORMANCE DIFFERENCES

To see whether the substantial cost differentials among the commissioning sources might be matched by differences in the performance of officers from the various programs, CBO examined three quantifiable measures of performance. The first measure was the length of time that officers remain in active military service after receiving their commissions. In general, academy graduates remain in service longer than officers from other commissioning programs. In the Army, for example, academy graduates serve an average of 11 months longer during their first 10 years of active duty than either scholarship or nonscholarship graduates of ROTC programs. Qualitatively similar results were found in the Navy and Air Force.

These modest differences in length of service, however, reflect other influences besides the effect of the source of commission. After making statistical adjustments to isolate the impact of the commissioning source, CBO found that other factors such as personal and military characteristics accounted for as much as three-quarters of the differentials. In the Army, for example, academy graduates were found to have served only 3 months longer than commissionees with the same characteristics who graduated from a scholarship ROTC program, rather than 11 months. Similar narrowing of the differentials occurred for the Navy and the Air Force.

A second measure of performance is the comparative promotion experience of officers from different procurement sources. CBO found that although the average months to promotion from pay grade O-2 to O-3 differed across services (29 for the Army, 26 for the Navy, and 24 for the Air Force), there was virtually no difference among the various commissioning sources within each service. Speed of promotion to pay grade O-4, however, did reveal some differences by commissioning program within each service. For the Army and the Air Force, academy graduates were promoted up to seven months sooner than other officers. The differential among Navy officers was somewhat smaller.

The third performance measure considered by CBO was the rate of involuntary separation from service among officers from different commissioning sources. Reasons for involuntary separation included moral, ethical, criminal, or professional misconduct, in addition to poor promotion performance. Rates of involuntary separation were found to be low for officers across the board, but were somewhat lower for ROTC graduates than for commissionees from either the academies or OCS/OTS.

These comparisons of cost and measures of performance associated with different commissioning programs may ignore some qualitative differences among officers related to their military training. Such differences could include leadership potential, suitability for promotions and command, or intangible personal qualities related to military capability. While the analysis in this paper may not have captured directly some relevant qualitative differences, nothing in the results CBO was able to quantify suggests that any commissioning program should be protected as overall officer strength is reduced.

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SUMMARY TABLE. DOD AVERAGE COST PER GRADUATE IN 1989  
(In dollars)

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	Army	Navy	Air Force
Academy	229,000	153,000	225,000
ROTC (Scholarship)	55,000	53,000	58,000
Officer Candidate School/ Officer Training School	15,000	20,000	18,000

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SOURCE: Data supplied by Department of Defense.

NOTE: ROTC = Reserve Officers Training Corps.

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## CHAPTER I

### INTRODUCTION AND BACKGROUND

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The United States is currently contemplating measures that will ensure a smaller military force in the future. This action has been prompted, to a large extent, by recent international developments as well as pressing domestic budgetary concerns. On the international front, the United States is presently engaged in arms control negotiations with the Soviet Union that would greatly diminish the threat of major military action and, in turn, the requirement for U.S. military capability. Domestically, the prospect of reduced military risk has heightened Congressional interest in using major reductions in defense spending to trim the persistent budget deficit.

Cutbacks in defense spending will undoubtedly entail a reduction in the size of active-duty military personnel. This downsizing of military forces will also mean cutting back the size of the officer corps, which in turn suggests a smaller requirement for new officers. In order to accomplish the drawdown of the officer corps in an efficient manner, a comparative analysis of the different programs that the military services use to train commissioned officers would be instructive. This paper presents such an analysis by the Congressional Budget Office (CBO) that focuses on the services' three principal programs for training officers (other than specialists, such as medical and legal officers). The three programs are the service academies, the Reserve Officers Training Corps (ROTC), and officer candidate or officer training schools (OCS/OTS).

After presenting some background on commissioning programs for officers, the paper addresses three main issues:

- o Service needs for new officers;
- o Costs of various commissioning programs; and
- o Measurable differences in the performance of officers from the commissioning programs.

### BACKGROUND

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Each of the military departments operates a service academy--the Army operates the Military Academy at West Point, the Navy the Naval Academy at Annapolis, and the Air Force the Air Force Academy at Colorado Springs. Together the three academies produced about 3,200 new officers in 1989. Cadets and midshipmen at

the academies receive four years of college education and pay and allowances during their student period. In return, they agree to serve a minimum of five years (six years for future graduates) on active duty after graduation.

Each of the military services (Army, Navy, Air Force, and Marine Corps) operates both scholarship and nonscholarship ROTC programs. Nonscholarship programs generally provide participants with free tuition and books in their military science courses, paid summer training, and a minimal stipend for a period of two years. In most cases, scholarship programs offer a more complete payment that includes full tuition, books, and fees, plus a school-year stipend of \$100 per month for a period of four years, and paid summer training. (Most Air Force scholarships pay tuition only up to a maximum of \$7,500 a year, and the Army has also begun imposing limits.) In 1989, about 9,800 new officers entered from both types of ROTC programs.

The Army and Navy also operate officer candidate schools; the Air Force calls its school an officer training school. All of these schools accept enlisted personnel who wish to become officers, as well as civilians who have completed college and seek a commission. The programs last at most 16 weeks and provide basic military education for prospective officers. In 1989, about 3,300 new officers entered from OCS and OTS.

#### REQUIREMENTS FOR OFFICER ACCESSIONS

For the next several years, all of the military services are likely to face substantial force reductions that will almost surely result in a smaller officer corps. Indeed, the process of reducing the size of the commissioned officer corps has been under way for several years. The Congress initiated the process by mandating reductions in active-duty officer strength in fiscal years 1987, 1988, and 1989.

Reductions in the total number of commissioned officers, of course, will lead to cuts in the required number of officer accessions. CBO estimates suggest that the total number of officers entering the military in 1989 was roughly the number required to maintain today's size of the officer corps (see Table A-1 in the Appendix). This estimate is based on "steady state" calculations that assume that the willingness of officers to stay in service remains at its 1988 level. If willingness to stay does not change, then any cuts in the officer corps would result in proportional reductions in requirements for new officer accessions.

If history is a guide, reductions in required accessions will result in disproportionately large cuts in entrants from officer candidate and officer training schools. In recent years, such OCS/OTS commissionees have made up a generally declining share of new officers--reduced from 28 percent to about 12 percent for all the services since 1980 (see Table 1). The share of military academy graduates has increased slightly from 9 percent to about 12 percent, while ROTC programs have increased their share from 25 percent to about 37 percent. Direct appointments, warrant officer appointments, and miscellaneous appointments make up the remainder of officer accessions.

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**TABLE 1. PERCENTAGE OF OFFICERS COMMISSIONED  
BY TRAINING PROGRAM**

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Calendar Year	Academies	ROTC	OCS/OTS
1980	9	25	28
1981	9	26	25
1982	9	30	20
1983	9	31	23
1984	11	36	19
1985	10	34	24
1986	11	31	23
1987	12	34	18
1988	13	38	13
1989	12	37	12

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**SOURCE:** Data supplied by Department of Defense.

**NOTES:** Percentages do not add to 100 percent because numbers exclude direct appointments (lawyers, doctors, and so forth), warrant officers, and others.

OCS = Officer Candidate School.  
 OTS = Officer Training School.  
 ROTC = Reserve Officers Training Corps.

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The trend toward a decline in commissionees from OCS/OTS is particularly likely to continue if total officer strength is reduced over the next few years. Cadets and midshipmen already enrolled or accepted in the academies will provide a continuing flow of officer accessions through 1994. Similarly, the number of new ROTC commissionees for the next two years is largely fixed by the number of young men and women currently in the last two years of their ROTC programs. The services could minimize reductions in OCS and OTS programs by assigning ROTC graduates directly to the reserve components or by delaying their dates of entrance into military service. But substantial cuts in OCS/OTS seem probable.

In view of this prospect, the Congress may wish to evaluate the comparative cost and performance of the different commissioning programs. At issue is whether the number of officer accessions from any single source, such as the service academies, should be protected against reductions, or whether all commissioning programs should be retained by the services in roughly their present proportions.

## CHAPTER II

### AN ANALYSIS OF PROGRAM COSTS AND

### PERFORMANCE OF COMMISSIONED OFFICERS

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This section compares the cost per graduate of officers from the various procurement programs and then analyzes several measures that reflect the relative performance of officers from the different commissioning sources.

#### COSTS OF COMMISSIONING PROGRAMS

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Measured in terms of costs to the Department of Defense (DoD), the average cost of an academy graduate ranged from \$153,000 to \$229,000 in 1989 (see Table 2).<sup>1</sup> The average cost per commissionee under the ROTC scholarship program was much lower, ranging from \$53,000 to \$58,000 in the three services. OCS/OTS costs per commissionee were much lower still, ranging between \$15,000 and \$20,000 for all three services. Costs were not available for graduates of nonscholarship ROTC programs.

As Table 2 shows, there is a sharp difference between the average cost of a graduate at the Naval Academy and costs at the other academies. Several possible reasons exist for this difference. One reason is the size of the physical plants. The Military Academy and Air Force Academy have, respectively, about 16,000 and 18,000 acres of land; the Naval Academy has less than 1,000 acres. The Naval Academy also provides less housing and medical care for its faculty, which is largely civilian. The faculties of the other service academies consist overwhelmingly of military personnel, who receive medical care and housing at government expense. There may also be other differences in costs among the academies, though these differences are difficult to discern from available data because the academies appear to account in different ways for similar costs—for example, those for administrative data processing and logistical support.

#### Differences in Costs Among Commissioning Sources

Although costs differ among the service academies, of particular importance in this paper are the sharp differences, regardless of service, in the costs among the three

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1. For several reasons, CBO's analysis does not include the Marine Corps. Since the Corps does not operate a military academy, cost comparisons with other commissioning programs would be incomplete; in addition, the Marine Corps Platoon Leaders Course is not precisely analogous to the programs of other services. Finally, the data on the performance of Marine Corps officers could not be analyzed in the same way as data from the other services because of the smaller number of Marine Corps officer accessions and the consequent lack of statistical validity.

TABLE 2. DOD AVERAGE COST PER GRADUATE IN 1989 (In dollars)

	Army	Navy	Air Force
Academy	229,000	153,000	225,000
ROTC (Scholarship)	55,000	53,000	58,000
Officer Candidate School/ Officer Training School	15,000	20,000	18,000

SOURCE: Data supplied by Department of Defense.

NOTE: ROTC = Reserve Officers Training Corps.

commissioning programs. A graduate of an ROTC scholarship program costs the Department of Defense about one-quarter to one-third as much as an academy graduate. These lower costs stem from several factors.

At most, ROTC scholarship programs pay the cost of all tuition and fees, rather than the full cost of a college education that would be financed in part by institutional support from gifts, grants, governmental aid, and perhaps other sources. The cost of ROTC graduates is also lower because many ROTC students attend schools that cost less to operate than the academies. The service academies would probably fall at the upper end of institutions ranked by cost. In this respect, they are similar to other highly selective colleges that focus on education in math, science, and engineering and provide a wide range of extracurricular activities. Finally, the service academies incur costs that other colleges and universities do not bear: full pay for students, mandatory summer programs, clothing and allowances for full board, and a full complement of military instruction in addition to a rigorous engineering curriculum. While ROTC programs also incur some of these costs--for example, stipends, summer training, and military instruction--the service academies clearly devote more resources to these activities.

Of the three principal commissioning programs, OCS/OTS is the least costly. A graduate of OCS or OTS costs the Department of Defense, on average, 6 percent to 13 percent as much as an academy graduate and about one-quarter to one-third as much as an officer obtained through an ROTC scholarship. One reason for these differences is that the government does not pay for any of the college education of OCS/OTS graduates. Also, the duration of OCS/OTS programs is much shorter than other commissioning programs, lasting a few months rather than two to four years.

#### Use of These Cost Data

The average costs borne by DoD shown in Table 2 are appropriate for some comparisons and decisions, but not for others. The average costs are a reasonable guide to the effects on the DoD budget of large changes in the number of candidates in officer commissioning programs.<sup>2</sup> Average costs would, however, overstate the effects of small changes in numbers of students, particularly at the academies. The academies incur substantial costs to maintain their facilities and basic educational services. Most of these costs would not change if there were small changes in the numbers of students. Assessing the effects of small changes in numbers of students would require an estimate of marginal costs, which cannot be obtained using the data available to CBO.

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2. Use of the average costs in Table 2 could overstate, though probably to a modest degree, savings to the federal government as a whole associated with changes in the numbers of academy cadets or other officer candidates. If DoD were to alter the number of students in its commissioning programs—for example, by reducing the size of the academies or the number of ROTC scholarships—then some of the students who would have participated in those programs would probably apply for other federal government aid, such as student grants or loans. Thus, a reduction in DoD programs could lead to higher costs in other portions of the federal budget.

Moreover, use of the DoD costs in Table 2 clearly overstates cost differences among commissioning sources if the desired measure is not just cost to DoD but rather the total cost to train a new military officer. The DoD costs in Table 2 reflect all the costs of providing a college education to students attending the academies but none or only part of those costs for graduates of ROTC and OCS/OTS.<sup>3</sup> If the full costs of educating ROTC and OCS/OTS graduates were included, then costs per graduate among the various commissioning sources would be more alike than those in Table 2.

### Adequacy of Cost Data

The cost data available to CBO are adequate to support conclusions about the average cost per graduate borne by the Department of Defense, particularly since the differences are large. But more detailed comparisons of costs would require better information. It is not always evident that costs for various commissioning programs include all the same categories of costs. Moreover, data on costs at the service academies contain many anomalies that make comparing various categories of costs at the three academies nearly impossible. Nor, as mentioned earlier, do the data available to CBO permit the calculation of the marginal costs of changing the numbers of commissionees, particularly for the academies.

## PERFORMANCE OF COMMISSIONED OFFICERS

The cost differences among the commissioning sources are striking. Are some or all of these sizable cost differences among the various commissioning programs reflected in the performance of their graduates?

### Measures of Performance

The performance of officers commissioned through the three principal programs could differ in two broad ways. First, the military services might realize longer service from one group, such as academy graduates, than from another, such as ROTC graduates. Longer service means that the cost of the government's investment yields a greater return--for example, by reducing the required number of new officers and thus holding down costs.

Second, one group of officers might offer service of higher quality or productivity than another group. Comprehensive measures of quality are elusive. As surrogate measures of quality, CBO used two quantifiable variables: time to promotion, and incidence of forced separation from service.

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3. Academy costs also include wages paid to cadets, but costs for graduates from other sources do not include any measure of wages forgone by students.



### Sources of Data

To examine officer performance, CBO compiled data from several sources. The services supplied some of the data. CBO also assembled data on all commissioned officers who entered active duty between 1979 and 1988. These data, which were provided by the Defense Manpower Data Center (DMDC), identified officers by source of commission as well as demographic, educational, and military characteristics. In all, nearly 255,000 individual officers were included in the data base, and up to 10 years of experience was analyzed for each officer. The limitations of the data and the estimation procedures used in the study are discussed in more detail in Appendix B.

### Length of Service

Data supplied by the services suggest that, compared with officers from other commissioning programs, academy officers serve for modestly longer periods in the military. In the Army, for example, rates of continuation in 1989 suggest that academy officers will serve an average of 13.9 years on active duty compared with 13.0 years for OCS graduates and 12.3 years for ROTC graduates. Thus, average length of service for academy graduates would be greater by between 7 percent and 13 percent. Differences were modestly larger based on rates of continuation in 1987 and 1988, but never reached more than 16 percent.

These results, however, may reflect more than differences in source of commission. The data include many factors that could affect length of service, including personal characteristics--such as race, sex, and marital status--as well as service factors such as military occupation. To isolate the effect of source of commission, CBO used statistical techniques to adjust for differences in these and other factors. These techniques were applied to data for officers entering in 1979, the earliest year for which detailed data are available. Thus, the results apply only for the first 10 years of service.

The data indicate that, in all three services, academy graduates have longer average lengths of service during their first 10 years of active duty than ROTC graduates. In the Army, academy graduates serve an average of 11 months longer than graduates of ROTC programs, either scholarship or nonscholarship (see Table 3). Similar findings are apparent for the Navy and Air Force, though the specific differences vary in size.

As much as roughly three-quarters of these modest differentials, however, stems from differences in the personal and career characteristics of officers rather than from their source of commission. For example, academy graduates in the Army actually served about three months longer (during their first 10 years) than officers with the same personal characteristics and military occupation specialty who graduated from a scholarship ROTC program, rather than the 11 months shown in the unadjusted data (see Table 3). Similarly, Naval Academy graduates actually served only 14 months longer than nonscholarship ROTC graduates with the same characteristics, rather than 21 months. For Air Force academy graduates, there was no difference in time served compared with scholarship ROTC commissionees after

TABLE 3. AVERAGE MONTHS OF ACTIVE MILITARY SERVICE DURING THE 1979-1989 PERIOD, WITH AND WITHOUT ADJUSTMENTS TO ISOLATE SOURCE OF COMMISSION, FOR OFFICERS ENTERING IN 1979

	<u>Army</u>		<u>Navy</u>		<u>Air Force</u>	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
Academy	98	98	98	98	106	106
ROTC (Scholarship)	87	95	95	96	99	106
ROTC (Nonscholarship)	87	92	77	84	99	103

SOURCE: Congressional Budget Office based on Department of Defense data.

NOTE: Unadjusted estimates reflect average months of service among all entering officers with the specified source of commission. Adjusted estimates are intended to isolate the effects of source of commission. Specifically, adjusted results are based on a regression analysis that was used to predict average months of service that would be expected from ROTC graduates if they had the same personal characteristics (for example, race and sex) and the same career characteristics (for example, military occupation) as academy graduates.

adjustment for personal characteristics, rather than the seven months indicated in the unadjusted data.

### Success at Being Promoted

The military services operate an extensive, highly competitive system for determining who is promoted. Thus, systematic differences in quality among officers from different commissioning programs should be more readily apparent in promotion data than in any other measure. Does the source of an officer's commission influence his or her chance of successful promotion?

Promotion to Pay Grades O-3 and O-4. Based on the experience of officers entering the military between 1979 and 1988, academy graduates did appear to fare better in terms of time between promotion to pay grade O-3 (captain or Navy lieutenant) and pay grade O-4 (major or Navy lieutenant commander, the highest pay grade reflected in our data on the first 10 years of military service). In both the Army and the Air Force, academy graduates were promoted up to seven months more rapidly than others (see Table 4). Differences were smaller in the Navy but still apparent.

CBO also received data from the Army that showed that, among officers promoted in the typical manner ("due course" promotions), selection rates to pay grade O-4 were higher for academy graduates than for officers from all other sources of commissioning, including ROTC, OCS, and direct appointments. (Selection rates indicate the percentages promoted among those who both remained in service and were considered for promotion.) Indeed, selection rates were higher for all pay grades from O-2 to O-7. But these data did not permit CBO to compare academy graduates with those from ROTC and OCS, which is the focus of the analysis.

Another measure for the rate of promotion, however, did permit specific comparisons and showed less systematic difference by source of commission. The Army supplied data that indicated the percentages of all officers entering the service who were eventually promoted to pay grade O-4. This measure reflects both the number of officers who remain in the military long enough to be eligible for promotion and their ability to win promotion to the higher rank. Thus, the measure summarizes the effects of length of service and promotion.

Specifically, these Army data on entrants promoted to pay grade O-4 show that, in the three years between 1988 and 1990, the rates of promotion vary widely (see Table A-2). Academy graduates showed the highest rates of promotion in 1988 and 1990, though the differences were modest. In 1989, academy graduates were tied for second in the rankings.

Source of commission did not have much effect on time between promotion to pay grade O-2 and pay grade O-3. Indeed, in the Air Force, all of those promoted averaged 24 months between promotions (see Table 4). Scholarship ROTC graduates took the longest to be promoted in the Army, but they had the most rapid promotion in the Navy. No systematic differences are apparent between academy graduates and others. Moreover, most officers are promoted to pay grade

TABLE 4. AVERAGE MONTHS BETWEEN PROMOTION, BY SERVICE AND SOURCE OF COMMISSION, FOR OFFICERS ENTERING BETWEEN 1979 AND 1988

	Pay Grades O-2 to O-3	Pay Grades O-3 to O-4
Army		
Academy	29	88
ROTC (Scholarship)	30 <sup>b</sup>	a/
ROTC (Nonscholarship)	29 <sup>b</sup>	91 <sup>b</sup>
Officer Candidate School	29	95 <sup>b</sup>
Navy		
Academy	26	61
ROTC (Scholarship)	26	61
ROTC (Nonscholarship)	26	61
Officer Candidate School	26 <sup>b</sup>	64 <sup>b</sup>
Air Force		
Academy	24	88
ROTC (Scholarship)	24	90
ROTC (Nonscholarship)	24 <sup>b</sup>	94 <sup>b</sup>
Officer Training School	24 <sup>b</sup>	95 <sup>b</sup>

SOURCE: Congressional Budget Office based on Department of Defense data.

NOTES: Derived from regression analysis controlling for education, marital status, number of dependents, race, sex, and primary military occupational specialty. The analysis selected only those officers for whom complete data were available.

ROTC = Reserve Officers Training Corps.

a. Fewer than 25 observations available.

b. Differences between these numbers and those for academy graduates are statistically significant ( $p = .05$ ). Because of the large sample size, some numbers differ in a statistically significant way even though they round to the same whole numbers.

O-3 at roughly the same time. Thus, promotion to pay grade O-3 is not as useful a measure as promotion to pay grade O-4.

Promotion to General and Admiral. Academy graduates clearly do fare better in promotions to general or admiral. Although the academies have usually provided roughly one-tenth or less of each year's new officers, nearly one-third of the general officers in the Army and the Air Force, and almost one-half of all Navy admirals, were commissioned at the academies (see Table 5). ROTC graduates, and to a lesser extent OCS/OTS graduates, are well represented among the generals and admirals. But the academies are clearly represented more than proportionally.

There are several possible explanations for this disproportionate representation of academy graduates. It may reflect the effects of the source of commission; academy graduates may be better prepared for these senior ranks than are graduates of ROTC or OCS/OTS. The disproportionate representation may also reflect past officer personnel policies regarding officers. In earlier years, many ROTC and OCS/OTS graduates were commissioned as reserve officers. These officers served on active duty but were not allowed to remain past about 10 years of service unless they applied for and were accepted as regular officers. Thus, some ROTC and OCS/OTS graduates might not have been allowed to remain in the military long enough to compete for promotion to the ranks of general or admiral. Another explanation for the disproportionate representation of academy graduates in these senior ranks is that the services' decisions about promotions and careers may be influenced by academy graduates who promote the careers of academy-trained officers.

### Involuntary Separation

Officers are involuntarily separated from the services if they fail to meet certain promotion standards. Other reasons for involuntary separation include moral, ethical, criminal, or professional misconduct. As a final measure of performance, CBO examined differences in rates of involuntary separation among commissioning sources.

Rates of involuntary separation, which are tabulated in Table 6 for all officers entering active duty between 1979 and 1988, are low for all groups of officers, though rates of involuntary separation tend to be lower for ROTC graduates than for graduates of the academies and OCS or OTS. Indeed, rates of separation for misconduct among ROTC graduates are negligible in all three services.

### CONCLUSION

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The military services currently face diminishing requirements for new commissioned officers. In the face of reduced demand, the services and the Congress will have to judge what proportion of new officers should come from the various training programs.

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TABLE 5. NUMBER AND PERCENTAGE OF GENERALS AND ADMIRALS AS OF MARCH 1990, BY SOURCE OF COMMISSION

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	Number	Percentage of Service Total
Army		
Academy	118	29
Reserve Officers Training Corps	229	56
Officer Candidate School	36	9
Other	25	6
Navy		
Academy	122	47
Reserve Officers Training Corps	38	15
Officer Candidate School	33	13
Other	66	25
Air Force <sup>a</sup>		
Academy	104	31
Reserve Officers Training Corps	153	45
Officer Training School	30	9
Other	52	15

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SOURCE: Data supplied by the Department of Defense.

NOTE: Data include officers in pay grades O-7 to O-10.

a. Results include Air Force generals who attended the Military Academy or the Naval Academy.

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TABLE 6. PERCENTAGE OF OFFICERS INVOLUNTARILY SEPARATED, BY SERVICE AND SOURCE OF COMMISSION, FOR OFFICERS ENTERING BETWEEN 1979 AND 1988

	Separated for Failure to Achieve Promotion	Separated for Misconduct
Army		
Academy	1.5	0.9
ROTC (Scholarship)	0.7	0.1
ROTC (Nonscholarship)	0.3	0.2
Officer Candidate School	1.2	1.3
Navy		
Academy	0.8	0.5
ROTC (Scholarship)	0.4	0.0
ROTC (Nonscholarship)	0.4	0.1
Officer Candidate School	0.8	1.0
Air Force		
Academy	0.6	0.7
ROTC (Scholarship)	0.1	0.0
ROTC (Nonscholarship)	0.2	0.1
Officer Training School	1.6	1.5

SOURCE: Data supplied by the Department of Defense data.

NOTE: ROTC = Reserve Officers Training Corps.

Measured in terms of costs to the Department of Defense, the service academies clearly are the most costly commissioning program. A new officer from the service academies costs the department about three to four times as much as one obtained through an ROTC scholarship program, and about eight to fifteen times as much as an officer obtained through OCS/OTS. Costs to DoD are the appropriate measure in assessing how changes in commissioning programs would affect the department's budget. However, other measures of cost are more appropriate in judging the full costs of training a military officer.

While data available to CBO indicate that academy graduates remain in the military for modestly longer periods and, by some measures, are promoted more rapidly or at higher rates, these differences are not large in most cases. Moreover, some of these differences may not result solely from the source of commission.

CBO's analysis of officer performance focused on quantifiable measures, and important qualitative differences may remain that are not captured by our measures. Among the relevant criteria that our measures might not fully capture are leadership skills, suitability for senior command, and intangible personal qualities. Justification for a commissioning program for officers might be greater to the extent the program is superior at identifying or inculcating these qualities.



## APPENDIX A

### TABLES


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**TABLE A-1. NUMBER OF REQUIRED OFFICER ACCESSIONS  
COMPARED WITH 1989**

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	Accessions Required to Maintain 1989 Officer Level <sup>a</sup>	1989 Accessions
Army	10,300	9,500
Navy	6,600	7,800
Air Force	8,600	7,530

SOURCE: Congressional Budget Office based on Department of Defense data.

a. These estimates assume that 1988 patterns of continuation in the services remain unchanged.

TABLE A-2. PERCENTAGE OF ENTERING ARMY OFFICERS PROMOTED TO PAY GRADE O-4 (MAJOR), BY YEAR AND SOURCE OF COMMISSION

	1988	1989	1990
Academy	50	45	47
ROTC (Scholarship)	33	35	46
ROTC (Nonscholarship)	36	57	30
Officer Candidate School	48	45	38

SOURCE: U.S. Army.

NOTES: Percentages represent those in the primary zone as a percent of all accessions who entered in 1978, 1979, and 1980, respectively.

ROTC = Reserve Officers Training Corps.

## APPENDIX B

### ESTIMATION METHOD

This appendix describes the analytic framework for evaluating the performance differences of officers from different commissioning sources. The data used in the statistical analysis are described first, followed by a discussion of the estimating technique and the detailed results of a representative regression.

#### Data and Limitations

The data used in the empirical estimation of the length of service and the months to promotion among officers from different commissioning programs were obtained from the Defense Manpower Data Center (DMDC). The data consist of nearly 255,000 individual records, which include all commissioned officers in the Army, Navy, and Air Force who entered on active duty between 1979 and 1988. Each record includes information on the officer's demographic, educational, and military characteristics as well as source of commission.

Although the data from DMDC are extensive, they exhibit certain deficiencies. Perhaps most important, CBO was unable to go back before 1979 because of limitations in the data provided to DMDC by the services. This made it impossible to track officer careers beyond 10 years of experience. In addition, some portions of the data had higher rates of error in the early years. This particular problem was resolved by relying on the information in the later years of individual officers' files. Comparisons would be aided, however, by additional years of data on continuation, promotion, and separation rates, as well as by more accurate data.

#### Variables and Estimation Technique

The analyses of the months to promotion and length of service use a single equation estimation procedure; all regressions are estimated for each service by ordinary least squares (OLS). Since the estimation is virtually the same for both investigations, the details of the procedure can be illustrated by focusing on the estimation of the time between promotion from pay grade O-3 to pay grade O-4 for Air Force officers entering service between 1979 and 1988. The basic equation estimates the number of months to promotion as a function of vectors representing personal attributes (P) and career or military factors (C):

$$MTP = m(P, C)$$

The specification of the explanatory variables used in the analysis varies. Some enter the regressions linearly, and others enter as binary-coded (zero-one) dummy variables. A description of the variables is presented in Table B-1. The particular specification of the estimating equation is represented as follows:

$$MTP = \alpha X + \beta Y + e$$

where:

MTP = number of months between promotion from pay grade O-3 to pay grade O-4 for the  $j$ th officer;

X = a vector of variables representing personal characteristics for the  $j$ th officer;

Y = a vector of variables indicating career characteristics of the  $j$ th officer;

$\alpha$ ,  $\beta$  = vectors of regression coefficients; and

e = disturbance term.

### Results

The results of the representative regression are shown in Table B-2. Of particular importance for this study are the coefficients of the variables indicating the various sources of commission. These coefficients represent the differential in the time to promotion for an officer from the respective commissioning source, relative to the time to promotion of an academy graduate with the same personal and military characteristics. Thus, Air Force academy graduates are promoted on an average of up to seven months more rapidly than other Air Force commissionees, as shown in Table 4 in the main text.

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TABLE B-1. DESCRIPTION OF VARIABLES

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Symbol	Variable Description
MTP	Number of months between promotion
DEPS	Number of dependents
	<b>Education</b>
ED1	Less than a college degree
ED2	College graduate (Bachelor's)
ED3	Master's degree
ED4	Doctorate and first professional degrees
	<b>Marital Status</b>
MARST1	Single
MARST2	Married
MARST3	Other than single or married
	<b>Sex</b>
SEX1	Male
SEX2	Female
	<b>Race</b>
RACE1	White
RACE2	Black
RACE3	Other (Hispanic, American Indian, Alaskan Native, Asian, Pacific Islander, Other)
	<b>Source of Commission</b>
SOC1	Air Force Academy
SOC2	ROTC (Scholarship)
SOC3	ROTC (Nonscholarship)
SOC4	OTS
	<b>Primary Occupation Code</b>
PROCC1	Tactical Operations Officers
PROCC2	Intelligence Officers
PROCC3	Engineering and Maintenance Officers
PROCC4	Scientists and Professionals
PROCC5	Health Care Officers
PROCC6	Administrators
PROCC7	Supply, Procurement, and Allied Officers

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TABLE B-2. REGRESSION RESULTS ON MONTHS BETWEEN  
PROMOTION FROM PAY GRADE 0-3 TO 0-4 FOR AIR  
FORCE OFFICERS ENTERING BETWEEN 1979 AND 1988  
(t-statistics in parentheses)

Independent Variable <sup>a</sup>	Coefficients	
Intercept	88.037 <sup>b</sup> (58.819)	
DEPS	0.176 (1.221)	
MARST2	0.465 (0.625)	
MARST3	2.271 <sup>b</sup> (1.964)	
SEX2	1.269 <sup>b</sup> (2.094)	
RACE2	-0.494 (-0.474)	
RACE3	-1.038 (-0.857)	
ED3	-2.378 <sup>b</sup> (-4.213)	
ED4	-0.476 (-0.352)	
PROCC2	-1.423 (-.740)	
PROCC3	-5.422 <sup>b</sup> (-4.216)	
PROCC4	-5.608 <sup>b</sup> (-5.923)	
PROCC5	-18.913 <sup>b</sup> (-22.375)	
PROCC6	-7.347 <sup>b</sup> (-5.975)	
PROCC7	-1.441 (-1.106)	
SOC2	2.208 (1.538)	
SOC3	5.583 <sup>b</sup> (4.068)	
SOC4	7.109 <sup>b</sup> (5.310)	
R <sup>2</sup>	0.3956	
Number of Observations		14,690

a. Dependent variable is the number of months to promotion.

b. Statistically significant at the .05 level or greater.